CLAIMS

What is claimed is:

1. An apparatus for providing information about operation of a spray device, the apparatus comprising:

an adapter assembly configured to be coupled to a movable part of a spray device;

a mounting assembly configured to be coupled to a stationary part of the spray device;

a transducer coupled to the mounting assembly or the adapter assembly; and

a linkage, adapted to extend between the mounting assembly and the adapter assembly, in operational relationship with the transducer to enable the transducer to indicate a mechanical relationship between the movable and stationary parts of the spray device corresponding to operation of the spray device.

2. The apparatus according to claim 1 wherein the mounting assembly includes a bearing and shaft assembly coupling the adapter assembly to the mounting assembly.

3. The apparatus according to claim 2 wherein the bearing and shaft assembly substantially maintains alignment between the adapter assembly and the mounting assembly in non-actuation axes.

4. The apparatus according to claim 1 further including a base assembly adapted to couple to the mounting assembly, the base assembly including a foot assembly

with a footprint that supports the spray device in a vertical relationship with the foot assembly.

5. The apparatus according to claim 4 wherein the apparatus and spray device has a predetermined weight for use on a weight measuring scale sensitive enough to measure a change in fluid ejected by the spray device in a single discharge.

6. The apparatus according to claim 5 wherein the total weight of the apparatus and spray device is less than or equal to 200 grams.

7. The apparatus according to claim 1 wherein the transducer is a position sensor.

8. The apparatus according to claim 7 wherein the position sensor is a potentiometer.

9. The apparatus according to claim 8 wherein the linkage is a spring loaded wire integrally associated with the potentiometer.

10. The apparatus according to claim 1 wherein the spray device is a nasal spray bottle.

11. The apparatus according to claim 1 wherein the spray device is a Metered-Dose Inhaler (MDI).

12. The apparatus according to claim 1 wherein the adapter assembly is configured to interface with an automated actuation system that operates the spray device in an automated manner.

13. The apparatus according to claim 12 wherein the transducer indicates the mechanical relationship in a format usable by the automated actuation system.

14. The apparatus according to claim 1 further including a data processing system coupled to the transducer that captures indications of the mechanical relationship between the movable part and the stationary part.

15. The apparatus according to claim 14 wherein the data processing system includes program instructions that automatically calculate parameters in position, velocity, or acceleration corresponding to operation of the spray device.

16. The apparatus according to claim 15 wherein the instructions include a routine that calculates velocity or acceleration data from position measurements using a least squares technique.

17. The apparatus according to claim 15 wherein the parameters include at least one of the following: maximum position displacement, hold time, maximum actuation velocity, maximum return velocity, maximum actuation acceleration, and maximum return acceleration.

18. The apparatus according to claim 14 wherein the data processing system includes a signal conditioner, data sampler, and amplifier, wherein the signal conditioner conditions a signal effected by the transducer prior to the data sampler and amplifier operating on the signal.

19. A method for providing information about operation of a spray device, the method comprising:

enabling a linkage in operational relationship with a transducer associated with a spray device, including a movable part and a stationary part, to move as a function of a mechanical relationship between the movable part and the stationary part; and

by the transducer, indicating the mechanical relationship between the movable and stationary parts of the spray device corresponding to operation of the spray device.

20. The method according to claim 19 further including providing components adapted to attach to the movable part and the stationary part and facilitating coupling between the components.

21. The method according to claim 20 further including substantially maintaining alignment in non-actuation axes between the movable part and the stationary part.

22. The method according to claim 19 further including supporting the spray device in a vertical relationship with a surface by way of at least one of the components.

23. The method according to claim 22 wherein supporting the spray device in a vertical relationship with the surface includes supporting an assembly including the spray device on a weight measuring scale sensitive enough to measure a change in fluid ejected by the spray device in a single discharge.

24. The method according to claim 23 wherein the assembly weighs less than or equal to 200 grams.

25. The method according to claim 19 wherein indicating the mechanical relationship includes outputting position information.

26. The method according to claim 25 wherein indicating the mechanical relationship includes making real-time electrical resistance measurements.

27. The method according to claim 26 wherein enabling the linkage to move as a function of the mechanical relationship between the movable part and the stationary part includes applying a constant force to the linkage.

28. The method according to claim 19 wherein the spray device is a nasal spray bottle.

29. The method according to claim 19 wherein the spray device is a Metered-Dose Inhaler (MDI).

30. The method according to claim 19 further including providing a component adapted to interface the spray device to an automated actuation system that operates the spray device in an automated manner.

31. The method according to claim 30 further including providing the mechanical relationship between the movable and stationary parts of the spray device in a format usable by the automated actuation system.

32. The method according to claim 19 further including capturing a signal corresponding to operation of the spray device.

33. The method according to claim 32 further including automatically calculating parameters in position, velocity, or acceleration based on the signal corresponding to the operation of the spray device.

34. The method according to claim 33 further including calculating velocity or acceleration data from position information using a least squares technique.

35. The method according to claim 33 further including calculating parameters including at least one of the following: maximum position displacement, hold time, maximum actuation velocity, maximum return velocity, maximum actuation acceleration, or maximum return acceleration.

36. The method according to claim 32 further including conditioning the signal prior to sampling or amplifying the signal.

37. An apparatus for providing information about operation of a spray device, the apparatus comprising:

means for enabling a linkage between a stationary part of a spray device and a movable part of the spray device in a manner allowing the linkage to move as a function of a mechanical relationship between the movable and stationary parts; and

means for indicating the mechanical relationship corresponding to operation of the spray device.